wherein R' is a hydrocarbon radical and preferably an alkyl radical of 1 to 6 carbon atoms and R is an alkyl radical, an alkoxy-substituted alkyl radical, or an alkyl-amine-substituted alkyl radical in which the alkyl groups have from 1 to 6 carbon atoms. The silane is typically used in amounts of 0.1 part by weight to 2 parts by weight, preferably from 0.1 part by weight to 0.5 part by weight based upon 100 parts binder.

Examples of some commercially available silanes are Dow Corning Z6040 and Union Carbide A-187 (gamma glycidoxy propyltrimethoxy silane); Union Carbide A-1100 (gamma aminopropyltriethoxy silane); Union Carbide A-1120 (N-beta(aminoethyl)-gamma-amino-propyltrimethoxy silane); and Union Carbide A-1160 (Ureido-silane).

The binder may contain an activator, which promotes the polymerization of furfuryl alcohol. The activator a tar selected from the group consisting of resorcinol pitch, bis phenol A tar, and mixtures thereof, preferably resorcinol. Bisphenol A tar is defined as the highly viscous product, which remains on the bottom of the reaction vessel after bisphenol A is produced and distilled from the reaction vessel. Bisphenol A tar is a solid at room temperature and has a melting point of about 70 °C to 80 °C. Bisphenol A tar is mostly dimers, trimers, and polymeric bis phenol A. It may also contain substituted materials.

A mixture of bisphenol A tar and resorcinol pitch can be used to modify the binder in an amount such that the ratio of bisphenol A tar to resorcinol pitch is from 3:1 to 1:3, most preferably about 1:1. The bisphenol compound used is bisphenol A, B, F, G, and H, but preferably is bisphenol A. The amount of bisphenol A tar used is typically from 1 part by weight to 10 parts by weight based upon 100 parts of binder.

The binder may also contain polyvinyl acetate. Typically the polyvinyl acetate used has a

Examples 1-2

(Test cores prepared with lake sand)

This shows a comparison of the hot and cold tensile strengths of test cores made with a conventional warm-box binder system (binder of Example A) with those containing BHMFO using a lake sand (Manley 1L5W sand). The binder compositions are set forth in Table I and the test results are set forth in Table II.

Table I

(Binder formulations used with lake sand)

	Example A	Example 1	Example 2
FR	40.98	36.88	32.78
FA	40.98	36.88	32.79
Water	3.74	3.37	2.99
PVA	4.99	4.49	3.99
RP	8.99	8.09	7.19
Silane	0.32	0.29	0.26
BHMFO	----	10.00	20.00
	100	100	100

Test Conditions

Sand:	Manley 1L5W sand, a lake sand
Binder:	1.25% B.O.S.
CAT:	25% B.O.B.
Temperature:	≈ 205 °C

Table III

(Binder of Example 3 used with silica sand)

FR	35.49
FA	35.48
Water	1.87
PVA	2.50
RP	4.50
Silane	0.16
BHMFO	20.00
	100.00

Test Conditions

Sand:	Badger 5574
Binder:	1.25% B.O.S.
CAT:	25% B.O.B.
Temperature:	≈ 205 °C

Table IV

(Test results using silica sand)

Example	**A**	**3**
Dwell Time (seconds)	**Hot Tensile Strength (psi)**	
20	116	166
30	143	181
40	175	224
Dwell Time (seconds)	**Cold Tensile Strength (psi)**	
20	398	463
30	407	444
40	422	408

The data in Table IV indicate that the binders of Example 3, containing BHMFO, produced test cores with higher hot and cold tensile strengths than the traditional warm box system (Examples A) when silica sand is used as the aggregate. Furthermore, if the results of Example 2 and 3 are compared, the data suggest that when silica sand is used, the tensile strengths of the test cores are improved when the dwell time is the same, which indicates that the cores are stronger when silica sand is used as the aggregate.

Example 4

(Test cores prepared with Badger sand)

Example 3 was repeated using Badger sand, a different type of silica sand. Several tests were run using different curing times. The results are set forth in Table V.

Test Conditions

Sand:	5574 Badger
Binder:	1.25% B.O.S.
CAT:	20% B.O.B.
Temperature:	≈ 218 °C

	Cure Time (seconds)	Hot Tensile Strengths (psi)
	Test 1	
Binder A	25 seconds	126
Binder of Example 3	18 seconds	161
	Test 2	
Binder A	30 seconds	139
Binder of Example 3	23 seconds	184
	Test 3	
Binder A	40 seconds	178
Binder of Example 3	33 seconds	219

These test results show that current invention can be cured 20-30% faster than the control without adversely affecting the tensile strengths of the test cores made with a binder within the scope of this invention. This is beneficial to foundries that need high productivity, because the cure time can be reduced, yet high tensile strengths can be obtained.